

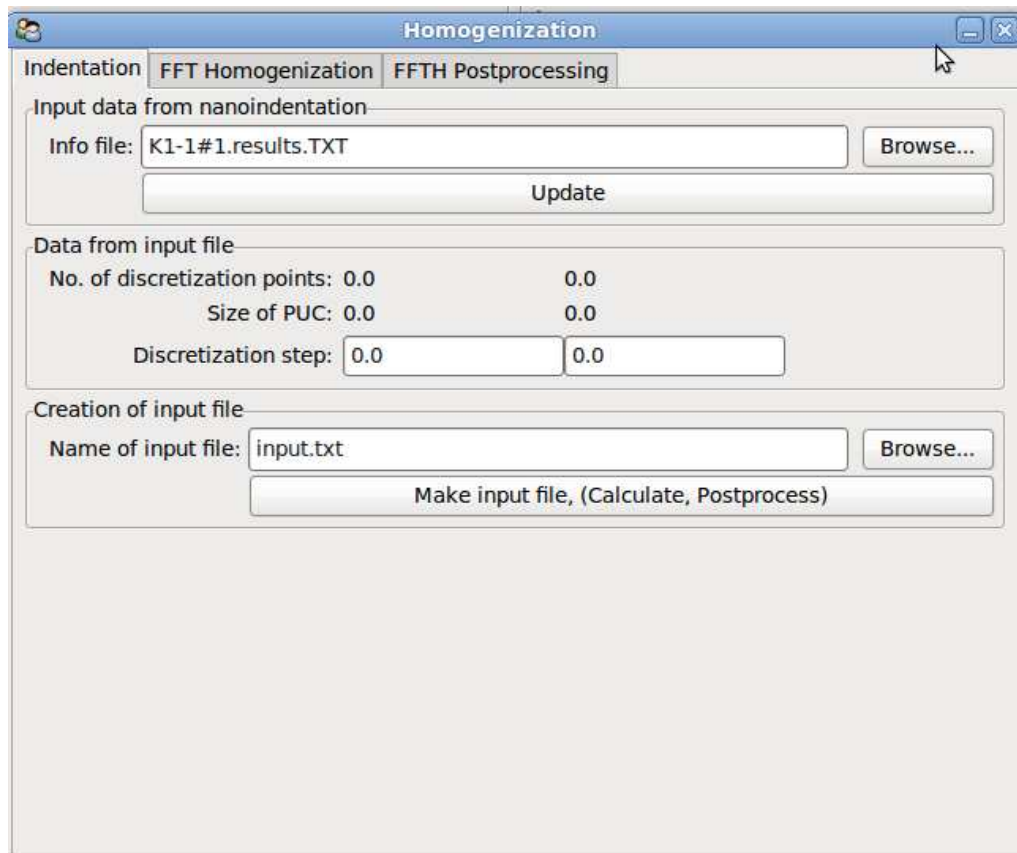
The python program based on FFT homogenization produces homogenized stiffness matrix from data obtained from nanoindentation.

The program is composed of couple of python files with the main file named “main.py” and can be launched in linux operating systems by command “python main.py”.

The program itself is composed of a window with three tabs shown on following figures.

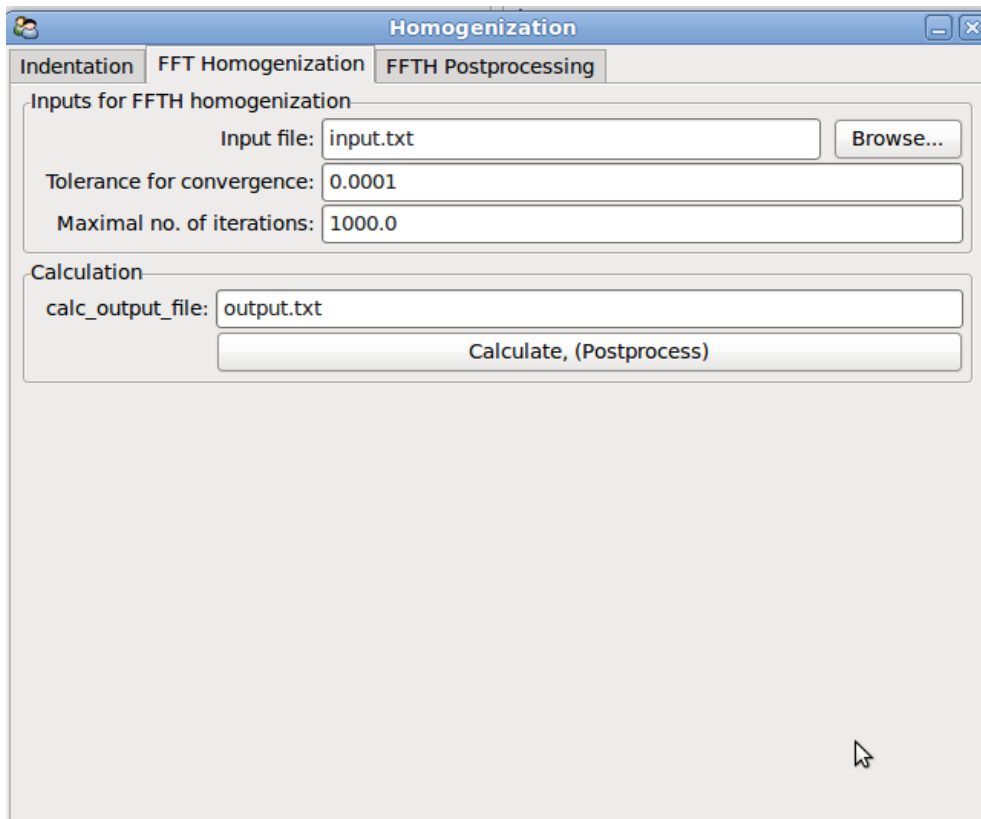
The tab “indentation” produces the input file for FFT homogenization.

- Input data from nanoindentation
 - Info file – the name of results file obtained from nanoindentation, e.g. “K1-1#1.results.TXT”
 - Update – read Info file
- Data from input file – the data read from Info file
 - No. of discretization points – the number of discretization points in x (vertical) and y (horizontal) directions
 - Size of PUC – the size of periodic unit cell
 - Discretization step – the size between two adjacent points in each direction of regular grid
- Creation of input file – creates the input file for FFT homogenization
 - Name of input file – the name of input file
 - Make input file – makes input file for FFT homogenization



The tab “FFT Homogenization” produces the homogenized stiffness from input file

- Inputs for FFTH homogenization
 - Input file – the name of input file in a format as e.g. “input.txt”, the preset value consist of the name from the tab “Indentation”
 - Tolerance for convergence – tolerance for convergence, the required norm for residual of linear system
 - Maximal no. of iterations – maximal number of iterations for the conjugate gradient algorithm
- Calculation
 - calc_output_file – the name of output file for a data from FFT homogenization
 - Calculate – the button firing the FFT homogenization



The tab “FFT Postprocessing” postprocess the data obtained from the FFT homogenization

- Postprocessing file
 - Postprocess file – the name of output file from the FFT homogenization in a format as e.g. “output.txt”, the preset value consist of the name from the tab “FFT Homogenization”
 - Update – read the data form postprocess file and shows it in “Outputs” group
- Outputs
 - Effective stiffness – Effective (homogenized) stiffness in Mandel`s notation obtained from FFT homogenization
 - No. of iterations – number of iterations used for calculation for the unit loading
 - Residual norm – residual norm achieved during iterations for particular unit loadings

